

THAT WHICH IS CLAIMED IS:

1. A method for producing encased products using selectable first and second horns to thereby produce products in selectable different casing types, comprising:
  - providing an apparatus having a first horn that, in operation, is configured to
  - 5 be in fluid communication with a filler pump located upstream thereof, the first horn configured and sized to allow product to flow therethrough and to cooperate with the apparatus to form and/or guide seamed casing material thereabout;
  - removing the first horn from the apparatus; and
  - mounting a second horn assembly comprising an intermediate pipe segment in
  - 10 fluid communication with a casing horn to the apparatus, wherein, in operation, the second horn assembly is configured to be in fluid communication with the filler pump to allow product to flow therethrough and the casing horn is configured to hold non-seamed casing material thereon.
- 15 2. A method according to Claim 1, wherein, in position on the apparatus, the first horn and the intermediate pipe segment have substantially the same axially extending centerline location.
3. A method according to Claim 2, wherein the casing horn resides
- 20 outside a footprint boundary defined by the apparatus and the intermediate pipe segment resides within the footprint boundary defined by the apparatus.
4. A method according to Claim 1, wherein, in position, the intermediate pipe segment is located upstream of the casing horn.
- 25 5. A method according to Claim 4, wherein the casing horn has opposing first and second ends, with the second end terminating into a horn rotor assembly and wherein the mounting the second horn assembly to the apparatus comprises:
  - attaching the horn rotor assembly to the apparatus;
  - 30 mounting the casing horn to the horn rotor assembly; and
  - pivoting the casing horn about a substantially horizontal pivot axis.

6. A method according to Claim 5, wherein the horn rotor assembly comprises a support leg attached thereto, and wherein the apparatus comprises a leg support bracket fixed thereto, and wherein the attaching step comprises sliding the support leg into the leg support bracket.

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7. A method according to Claim 6, wherein the second end portion of the casing horn terminates into a pivot head configured with a flow port that, during operation, is adapted to allow product to flow therethrough so that the product travels from the intermediate pipe segment through the pivot head and then to the casing horn, the pivot head comprising a coupling member configured to rotate inside a socket, the method further comprising:

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pivoting the casing horn to a substantially horizontal axially aligned orientation from a laterally offset substantially horizontal orientation; and aligning the coupling member in the socket to seal the pivot head for operation.

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8. A method according to Claim 6, positioning the intermediate pipe segment in the apparatus so that the intermediate pipe segment is affixed to the apparatus after the support leg is inserted into the bracket.

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9. A method according to Claim 1, wherein the first horn is longer than either the intermediate pipe segment or the casing horn.

10. A method according to Claim 9, wherein the first horn, the intermediate pipe segment and the casing horn are stainless steel tubular members.

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11. A method according to Claim 1, wherein the first horn has opposing first and second ends defining a first length and the second horn assembly has opposing first and second ends defining a second length, and wherein the first and second lengths are substantially equal.

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12. A method according to Claim 1, wherein the apparatus is a heat-seal apparatus, the method further comprising, when the first horn is in position:

forming planar sheet material about the first horn into a tubular casing configuration with axially extending end portions; and  
sealing the end portions together.

5           13.     A method according to Claim 12, further comprising, when the second horn assembly is in position, pivoting the casing horn out of axial alignment and then placing a slug of casing material onto the casing horn.

10           14.     A method according to Claim 13, further comprising selectively serially engaging the first end portion of the casing horn and the first end portion of the first horn with a shirred voiding/clipping apparatus positioned downstream thereof, the shirred voiding/clipping apparatus having a substantially fixed position thereby producing product encased in a selected casing material.

15           15.     A method according to Claim 14, further comprising positioning a voiding clipping mechanism on the casing horn when the casing horn is in use and tensioning the slug of casing material.

20           16.     A method according to Claim 14, further comprising automatically attaching a clip and/or tie at desired intervals along a length of encased product to thereby form chubs of linked or non-linked encased product.

            17.     An apparatus with interchangeable horns for engaging a filler/product pump and supplying elongate casings for encasing products therein, comprising:

25           a housing having a support structure and opposing upstream and downstream end portions;

            a first horn releaseably mountable to the housing support structure, the first horn having a length, an outer surface and an internal flow channel therein, wherein, in operation, the first horn is configured to direct casing material to travel over the outer surface while product travels through the internal flow channel; and  
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            a horn rotor assembly releasably mountable to the housing support structure, the horn rotor assembly comprising a pivotable casing horn with an outer surface and an intermediate pipe segment, each having a respective internal flow channel therein,

wherein, in operation, product travels through the intermediate flow channel into the pivotable casing horn while the casing horn is adapted to allow a supply of casing material to travel over the outer surface thereof.

5           18.     An apparatus according to Claim 17, wherein the first horn is a heat seal horn configured to cooperate with sheet roll stock to form seamed elastomeric tubular casing *in situ*.

10           19.     An apparatus according to Claim 18, further comprising means for forming and sealing planar elastomeric sheet roll stock operably associated with the housing.

15           20.     An apparatus according to Claim 17, wherein the first horn axially extends beyond a footprint defined by the housing and the intermediate pipe segment resides substantially within the footprint defined by the housing.

20           21.     An apparatus according to Claim 17, wherein the intermediate pipe segment and the first horn are configured to serially mount to the housing support structure so that, in position, each is aligned therein to have substantially the same axially extending centerline.

25           22.     An apparatus according to Claim 17, wherein the horn rotor assembly has an overall assembled length that includes the assembled respective lengths of the casing horn, pivot head and intermediate pipe segment with the overall assembled horn rotor assembly length being substantially the same as the first horn length.

30           23.     An apparatus according to Claim 17, wherein the housing support structure comprises a support bracket disposed on the downstream end portion of the housing, and wherein the horn rotor assembly comprises a support member configured and sized to releasably attach to the support bracket.

24.     An apparatus according to Claim 22, wherein the housing support structure comprises at least one mounting clamp that serially releasably attaches the

intermediate pipe segment and/or the first horn, the apparatus further comprising a proximity switch configured to cooperate with the pivot head to detect when the casing horn is in an operational position.

5           25.     An apparatus according to Claim 17, wherein, in operation, the apparatus further comprises a length of seamed tubular elastomeric film held over the outer surface of the first horn and/or a slug of stretchable fibrous casing held over the outer surface of the casing horn.

10           26.     An apparatus according to Claim 17, in combination with a shirred voiding/clipping apparatus, wherein the first horn and the horn rotor assembly are serially mountable to the housing to selectively output a desired casing to a downstream shirred voiding/clipping apparatus that engages an installed first horn or casing horn.

15           27.     An apparatus according to Claim 17, wherein the first horn and the horn rotor assembly are serially mountable to the housing so that either the first horn or intermediate pipe is in fluid communication with a filler/product pump disposed upstream of the housing.

20           28.     An apparatus according to Claim 17, wherein the horn rotor assembly pivotable casing horn comprises a pivot head with a coupling member having a semi-spherical profile and a flow passage held in a socket member having a flow passage, the socket member configured to snugly receive the coupling member while allowing  
25 the coupling member to pivot relative thereto, and wherein, in a casing material load position, the pivot head is configured to allow the casing horn to angle generally laterally outward out of axial alignment and, in operative position, the pivot head is configured to allow the casing horn to extend in a substantially horizontal axial aligned position.

30           29.     An apparatus according to Claim 28, wherein the coupling member comprises a groove disposed about an outer surface thereof and an O-ring held in the groove, wherein in operative position, the coupling member and socket flow passages

are substantially aligned and the coupling member and socket are sealed to direct product through the flow passages into the casing horn flow channel to thereby inhibit product from otherwise discharging from the pivot head.

5           30.    A horn rotor assembly, comprising:

          an elongate casing horn having opposing first and second end portions, an outer surface and an internal flow channel, the first end portion configured to reside upstream of the second end portion, wherein the first end portion is adapted to pivotably mount to a support structure to allow the second end portion to pivot side to side about a pivot axis.

          31.    A horn rotor assembly according to Claim 30, further comprising a pivot head having a flow passage extending therethrough, the first end portion of the elongate casing horn attached to the pivot head, wherein the casing horn and pivot head are configured to allow the casing horn to pivot side to side about the pivot axis, from a substantially horizontal axially aligned configuration to a generally horizontal laterally offset configuration, with the casing horn flow channel and pivot head flow passage in fluid communication.

20           32.    A horn rotor assembly according to Claim 31, further comprising a support member attached to the pivot head.

          33.    A horn rotor assembly according to Claim 32, wherein the support member is a support leg that extends from a side portion of the pivot head substantially vertically downward.

          34.    A horn rotor assembly according to Claim 31, further comprising an intermediate pipe segment releaseably attachable to the pivot head so as to be in fluid communication with the pivot head flow passage and casing horn flow channel.

30           35.    A horn rotor assembly according to Claim 30, further comprising a protrusion member mounted to the pivot head, the protrusion member configured to

align with a proximity sensor when in operative position to thereby identify that the casing horn and pivot head are in proper operative position.

36. A horn rotor assembly according to Claim 31, wherein the pivot head  
5 comprises a coupling member having a semi-spherical profile that is held in a socket member, the socket member configured to snugly receive the coupling member while allowing the coupling member to pivot relative thereto.

37. A horn rotor assembly according to Claim 31, wherein, in a casing load  
10 configuration, the pivot head is configured to allow the casing horn to angle laterally outwardly and, in operative position, the pivot head is configured to allow the casing horn to extend in a substantially horizontal axially aligned position.

38. A horn rotor assembly according to Claim 31, wherein the coupling  
15 member comprises a groove disposed about an outer surface thereof and an O-ring held in the groove, and wherein in operative position, the coupling member and socket flow passages are substantially aligned and the coupling member and socket are sealed to direct product to flow through the flow passages into the casing horn while inhibiting product from otherwise discharging from the pivot head.

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39. A horn rotor assembly according to Claim 30, wherein the horn rotor assembly is configured to mount to a heat-seal tubular casing fabrication apparatus, with the second end portion of the elongate casing horn engaging a shirred voiding/clipping apparatus.

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40. A horn rotor assembly according to Claim 32, further comprising an intermediate pipe segment attached to the pivot head so as to be in fluid communication with the pivot head flow passage and casing horn flow channel, wherein the support member attaches to a support bracket attached to a heat-seal  
30 apparatus and the intermediate pipe segment is sized and configured to mount to a common support region adapted to interchangeably mount a heat-seal horn and the intermediate pipe segment.

41. A horn rotor assembly according to Claim 40, wherein the intermediate pipe segment and the heat-seal horn serially reside in the apparatus so as to have a substantially common axial centerline when each is in a respective operative position.

5 42. A horn rotor assembly according to Claim 41, wherein the combined length of the assembled intermediate pipe segment, the pivot head and the casing horn is substantially the same as the heat-seal horn length.

43. A horn rotor assembly according to Claim 30, further comprising an  
10 intermediate pipe in fluid communication with the elongate casing horn, in combination with an automated tubular casing fabrication apparatus that produces heat-sealed seamed casings using a heat-seal horn, wherein the horn rotor assembly is configured to releasably mount to the apparatus with the intermediate pipe segment and casing horn configured to replace the heat seal horn.

15 44. A kit for modifying an apparatus that produces tubular casings from roll-stock to output non-seamed casings, comprising:  
a casing horn and an intermediate pipe segment;  
a bracket configured to mount to the apparatus and hold the casing horn and/or  
20 intermediate pipe segment with respect thereto; and  
a pivot head attachable to the casing horn forming a horn rotor assembly that allows the casing horn to pivot generally laterally from a casing load configuration to an operative position.

25 45. A kit according to Claim 44, wherein the casing horn, pivot head and intermediate pipe segment have an overall length that substantially corresponds to a length of a heat-seal horn adapted to be held in the apparatus.

30 46. A kit according to Claim 44, further comprising a tension clip attachable to the horn rotor assembly or bracket and configured to hold an end portion of a slug of fibrous shirred casing material for cooperating with a limit switch to identify when a length of the casing material is expended.



47. A kit according to Claim 44, wherein the pivot head includes a protrusion that cooperates with a proximity sensor to identify when the casing horn and/or pivot head is in proper operative position.

5 48. A kit according to Claim 44, further comprising a support member attached to the pivot head and configured to be held in the bracket to thereby hold the casing horn in aligned axial position with the intermediate pipe segment.

49. A kit according to Claim 48, further comprising at least one clamp  
10 configured and sized to secure the intermediate pipe segment to the pivot head.

50. A computer program product for operating an apparatus that releaseably mounts a plurality of different selectable horns to supply different casing material and fill the selected casing material to provide an encased elongate product,  
15 the computer program product comprising:

a computer readable storage medium having computer readable program code embodied in said medium, said computer-readable program code comprising:

computer readable program code configured to provide a plurality of different predetermined operational modes for an apparatus that releaseably mounts first and  
20 second horns with different horn configurations to supply different casings over an outer surface thereof and a flowable product therethrough; and

computer readable program code configured to run one of the predetermined operational modes responsive to whether a first horn with a first casing material or a second casing horn with a second casing material different from the first casing  
25 material is in communication with the apparatus.

51. A computer program product according to Claim 50, further comprising computer readable program code that accepts user input to identify the type of casing material selected for deployment and/or a selection of the operational  
30 mode associated with either the first or second horn.

52. A computer program product according to Claim 51, further comprising computer readable program code configured to inhibit operation until the desired horn is in proper operative position.

5 53. A computer program product according to Claim 52, wherein the computer readable program code that inhibits operation comprises computer readable program code configured to obtain and analyze data from a proximity sensor positioned to automatically detect when the second horn is in operative horizontal position.

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54. A computer program product according to Claim 50, further comprising computer readable program code configured to automatically identify when a casing supply on the second horn is exhausted.

15 55. A computer program product according to Claim 54, wherein the computer readable program code configured to identify when a casing supply on the second horn is exhausted comprises computer readable program code that detects when a limit switch is triggered responsive to force applied to a lead attached to a trailing edge portion of the supply of casing material as the trailing edge portion of the casing material advances.

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56. A computer program product according to Claim 54, further comprising computer readable program code configured to obtain and analyze data from a proximity sensor positioned to automatically detect when the second horn is in an operative position.

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57. A computer program product according to Claim 56, further comprising computer readable program code configured to selectively disregard: (a) the computer readable program code configured to identify when a casing supply on the second horn is exhausted; and/or (b) the computer readable program code configured to obtain and analyze data from a proximity sensor positioned to automatically detect when the second horn is in operative horizontal position, when the apparatus is operating with the first horn.

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58. A computer program product according to Claim 50, further comprising computer readable program code configured to supply sheet roll stock to the first horn and form the roll stock into a tubular casing configuration *in situ*.

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59. A computer program product according to Claim 58, further comprising computer readable program code that allows a manual stop and start to interrupt product flow to allow an operator to serially position a slug of fibrous casing material on the second horn.

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60. A computer program product according to Claim 58, further comprising computer readable program code configured to control product flow from a pump positioned upstream of the apparatus to direct the product to flow through one of the first horn or second horn, responsive to which is installed in communication with the apparatus.

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61. A computer program product according to Claim 50, further comprising computer readable program code that automatically identifies the desired operational mode by detecting which horn is in position on the apparatus.

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62. A computer program product according to Claim 61, further comprising computer program code that cooperates with a shirred casing voiding/clipping apparatus to deliver clips to encased product provided by the first or second horn, depending on which is operative.

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63. A system for producing encased products using selectable first and second horns to thereby produce products in selectable different casing types, comprising:

an apparatus having a releaseably mountable first horn that, in operation, is configured to be in fluid communication with a filler pump located upstream thereof, the first horn configured and sized to flow product therethrough and to cooperate with the apparatus to form, seal and/or guide seamed casing material thereabout; and

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a releaseably mountable second horn assembly comprising an intermediate pipe segment in fluid communication with a casing horn, wherein, in operation, the second horn assembly is configured to replace the first horn and be in fluid communication with the filler pump for flowing product therethrough.

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64. A system according to Claim 63, wherein the casing horn is configured to hold non-seamed casing material thereon and wherein, when in position on the apparatus, the first horn and the intermediate pipe segment have substantially the same axially extending centerline location.

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65. A system according to Claim 63, wherein the casing horn has a pivotable end portion.

66. A system according to Claim 64, wherein the second horn assembly  
15 comprises a horn rotor with a pivot head having a coupling member and socket configured to allow the casing horn to pivot relative thereto, and wherein the casing horn has a load configuration with the casing horn oriented angularly outward from upstream piping and an operative configuration with the casing horn oriented substantially horizontally axially aligned with upstream piping.

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67. A system according to Claim 66, wherein the horn rotor comprises a support leg attached thereto, and wherein the apparatus comprises a leg support bracket fixed thereto, and wherein the means for mounting comprises mounting the support leg in the leg support bracket.

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